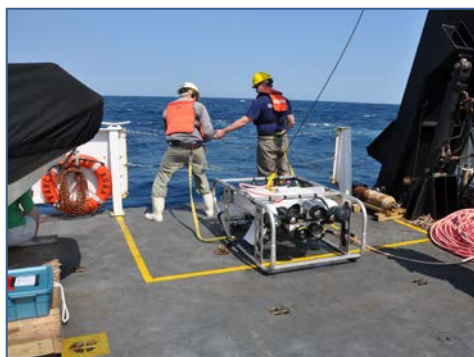


## Education

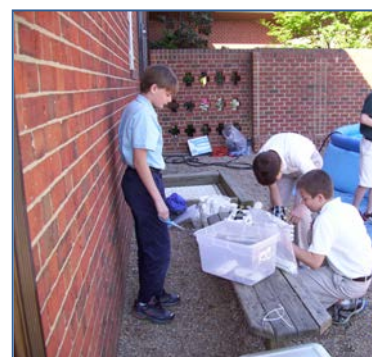
# New STEM Course: Exploring STEM through Shipwrecks



Students conduct a plankton tow aboard NOAA's SRVx *Sand Tiger*. Photo: Rodney Culverhouse



Maritime archaeologists deploy an ROV from NOAA Ship *Nancy Foster* to photograph an unknown shipwreck for possible identification—Photo: NOAA



Students work to redesign their ROV—Photo: NOAA

## Grade Level

6<sup>th</sup> through 12<sup>th</sup> grades

## Timeframe

This is a semester-long course, but can be expanded or shortened as needed. All activities can also stand-alone.

## Materials

Materials vary per activity, but we strive to make them simple and inexpensive.

Teachers may borrow kits for the design and construction of the ROVs.

If a school wants to create its own set of kits, step-by-step instructions are provided.

## For More Information

Contact:

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757-591-7328 (office)  
757-869-1370 (cell)

## Teacher Workshop

On June 26, 2014, from 9 am to 3 pm, MNMS will host a free teacher workshop for educators interested in learning more about the new STEM course, its curriculum and the success of the Crittenden Middle School pilot program. Teachers will build ROVs, map a shipwreck, conduct water quality testing, and more. A tour of the conservation lab at The Mariners' Museum will culminate the day. Space is limited, so hurry to reserve your space, by contacting Shannon Ricles at [Shannon.Ricles@noaa.gov](mailto:Shannon.Ricles@noaa.gov) or 757-591-7328.

## Course Summary

In partnership with Newport News Public Schools and Crittenden Middle School, Monitor National Marine Sanctuary (MNMS) developed a semester-long course for middle school students with an easy extension to high school. The course focuses on the health of the Chesapeake Bay, while students learn about shipwrecks, maritime heritage, data buoys and marine engineering. Through a variety of hands-on activities, using problem-based learning, students work to solve real-world problems.

NOAA subject matters experts interact with the students through lectures, demonstrations and activities. The students engineer, build and deploy a data buoy to collect water quality data and begin to grow oysters for a future restoration project. They become engineers to design their own remotely operated vehicle (ROV), and they explore NOAA's real-world use of ROVs in the field to search for and document shipwrecks. The course concludes with a Socratic seminar.

## Course Curriculum

In collaboration with Crittenden Middle School teachers, a STEM focused course curriculum was developed. **Teachers attending the workshop will receive a free copy of the curriculum.**

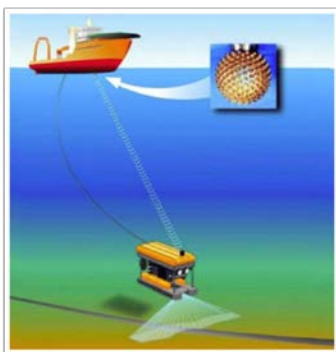
# NATIONAL MARINE SANCTUARY SYSTEM



Scale varies in this perspective. Adapted from National Geographic Maps.

## The Three Prongs

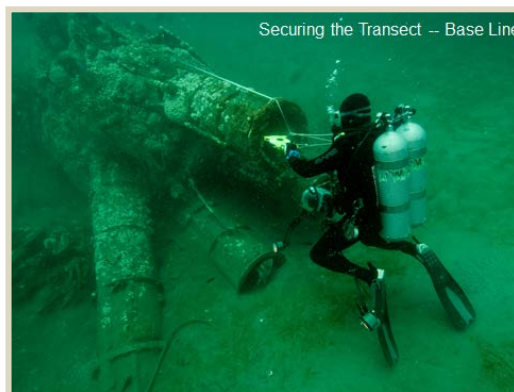
The program consists of three major goals. The first is to submerge students in maritime heritage. Our country is and has always been a seafaring nation, and the shores of Virginia and North Carolina are littered with shipwrecks that offer a unique and rich look into our history. These shipwrecks are threatened both by nature and by man. Students will be asked to determine the best course of action to take for a newly discovered fictitious shipwreck, while considering shipwreck ethics and balancing their decisions for the good of the resource, as well as for the pleasure of the public. In their endeavors, they will use primary source documents, shipping records and other historical documents.



Artistic representation of an ROV being towed by research vessel—Photo: NOAA

The second goal is to focus on STEM. Students will learn the science behind remotely operated vehicles (ROV) by understanding Newton's Laws of Motion, buoyancy, properties of air and more. They will explore marine technology by interacting with a maritime archaeologist, NOAA research vessel crew and other subject matter experts. They will learn to read sonar images, how to map a shipwreck and become engineers as they design and build an ROV for competition.

The third goal is to learn about the health and future of the Chesapeake Bay. Students will recognize that the bay serves as a valuable habitat for animal life and that oysters play an important role in its health. They will design,



Maritime archaeologist secures a base line to begin documenting a shipwreck—Photo: NOAA

engineer, and build a buoy, collect water quality data, learn about ecosystems and grow oysters for a future restoration project.

These three goals are intertwined to represent the complexity of real-world problems. Students will spend the semester studying many different facets of a problem and then conclude with a Socratic seminar with NOAA representatives. By using the mystery and allure of shipwrecks, the program will prove to excite and motivate students in STEM learning.

We hope that you and your school will consider this fascinating approach to STEM as you prepare for the 2014-2015 school year.



German U-boat 701 sank off North Carolina's coast during WWII—Photo: NOAA